

hadmen in the South Atlantic summer fishery alone was 34,435 metric tons.

Estimates of the thread herring population size expressed in metric tons equal approximately  $45,000 \pm 23,000$  in 1968 and  $71,000 \pm 21,000$  in 1969. The 95% confidence intervals suggest that true population size might vary from 22,000 to 92,000 metric tons. Thus, the thread herring resource appears capable of supporting a larger fishery at this time since not more than 10% of the population was harvested in 1968 or 1969, but it does not appear to have the capacity to offer an alternate resource for the Atlantic menhaden fishery. Thread herring distribution is generally limited to the South Atlantic area, whereas Atlantic menhaden are distributed along most of the Atlantic coast of the United States. A 50% harvest rate, at most, would amount to little more than the present menhaden landings in the South Atlantic summer fishery.

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#### MERICISTIC CHARACTERS OF SOME MARINE FISHES OF THE WESTERN ATLANTIC OCEAN<sup>1</sup>

This report presents data on meristic characters from radiographs of 642 species of marine fishes representing 113 families, collected from Cape Hatteras, N.C., to northern Brazil, including the Gulf of Mexico and the Caribbean Sea. Most of the specimens were collected on cruises of the National Marine Fisheries Service. The chartered vessel *Silver Bay* and the NMFS research vessel *Oregon* made these cruises from the Exploratory Fishing and Gear Research Base, Pascagoula, Miss., and the Exploratory Fishing and Gear Research Station, St. Simons Island, Ga. Additional material was obtained from shrimp trawling and beach seining in coastal Georgia. Papers by Hollister (1936, 1937a, b, 1940, 1941), Clothier (1950), Hubbs and Lagler (1958), and Lagler, Bardach, and Miller (1962) were helpful in determining vertebral and other skeletal characters. The phylogenetic arrangement and spelling of families, genera, and species were made, when applicable, in accordance with the American Fisheries Society's *List of Common and Scientific Names of Fishes* (Bailey, 1970).

#### Methods and Procedures

We x-rayed at least four specimens of most species; for some species fewer than four were available. Specimens ranged from 12 to 580 mm standard length (SL). Specimens smaller than about 60 mm SL were x-rayed with a soft-ray machine and larger specimens with a hard-ray machine.

Counts of precaudal and caudal vertebrae, dorsal and anal spines, and soft rays, and primary and secondary caudal rays were made with the aid of a dissecting microscope or an x-ray illuminator. These meristic counts for all species were made independently by each of us;

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we exchanged radiographs and checked each other's work; then at a later date and following the same procedures, we reread the radiographs.

The counts (Table 1) very likely do not represent the complete range for any species because too few specimens have been examined. Counts from specimens with obvious deformities or any recognizable abnormality or aberration are not included. When more than one separate dorsal or anal fin is present, and composed of soft rays only (e.g., Gadidae and Moridae), the count for the anterior fin is followed by a comma and the count for the posterior fin. Dashes are used to separate counts, or to replace counts to indicate that we were unable to make an accurate count from the radiograph.

In the dorsal fin in *Macrozoarces americanus* (Zoarcidae), two groups of soft rays are separated by spines. Finlets in Carangidae, Gempylidae, Scomberesocidae, and Scombridae are separated from fin-ray counts by a plus (+) sign. A plus sign is also used to show a divided anal fin in Sternoptichidae.

*Cyclopterus lumpus* and *Enchelyopus cimbrius* normally occur north of the study area, but their meristics were available and are included in this paper for comparative purposes. Some species which are anadromous have been included, e.g., *Alosa sapidissima*, even though the adults have been taken only in fresh or brackish waters. Other species, e.g., *Agonostomus monticola*, are reported in the literature as occurring in fresh water only but are included here because at times they have been found in the ocean (Anderson, 1957).

#### Definitions

In the following definitions we have tried to provide a general scheme for distinguishing the meristic characters of 642 different species although all specimens of all 642 species do not agree with our guidelines.

**Total vertebrae:** All vertebrae, includes the anterior-most centrum, and the urostyle which we count as the terminal centrum.

**Precaudal vertebrae:** Vertebrae with no hemal arches or hemal spines.

**Caudal vertebrae:** Vertebrae with hemal spines; typically the first hemal spine is associated with one or more anterior proximal radial elements of the anal fin. Our definition of precaudal and caudal vertebrae will not work for all species because in certain groups, e.g., Clupeidae, transitional centra may be present. If transitional centra are known to occur, the total number of vertebrae is a more meaningful character than a precaudal and caudal vertebral separation.

**Spines:** All true spines are median unpaired structures, without segmentation; they are usually stout and rigid with sharp tips and are never branched.

**Rays (Soft rays):** Are usually, though not always, branched and flexible, and are paired and segmented. Dorsal and anal fin-ray counts include all rays observed. If the terminal ray is bifid and articulated with a single pterygiophore, it is counted as one ray. Dorsal or anal fin spines are tabulated as a group; a spine in the second fin (if a spine is present) is counted with the spines of the anterior fin.

We distinguished caudal primary (principal) soft rays as those which articulate with the hypural bones. Typically the primary rays include all of the branched rays plus one dorsal and one ventral unbranched ray. In some species the primary caudal rays may all be branched. Some species have primary rays only. Primary rays often overlap onto the epural bones or hemal spine of the penultimate vertebra, and our personal judgment, based upon our interpretation of the literature, was used to determine if the ray was primary or secondary (procurent). In a few species no distinction between primary and secondary rays could be made from the radiograph, and the total number of caudal soft-rays is listed.

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TABLE 1.—Meristic characters of some marine fishes of the western North Atlantic Ocean.

FAMILY Genus, species	Size range SL mm	Speci- mens exam- ined No.	VERTEBRAE			DORSAL FIN		ANAL FIN		CAUDAL FIN				
			Total	Precaudal	Caudal	Spines	Rays	Spines	Rays	Total	Dorsal secondary rays	Dorsal primary rays	Ventral primary rays	Ventral secondary rays
ACANTHURIDAE														
<i>Acanthurus bahianus</i>	46	1	22	9	13	9	27	3	22	28	6	8	6	6
<i>Acanthurus chirurgus</i>	27-110	5	22	9	13	9	23-24	3	21-23	26	5	8	8	5
<i>Acanthurus coeruleus</i>	26-81	4	22	9	13	9	26-28	3	26-27	26	5	8	8	5-6
ALELUIDAE														
<i>Albulus nemoptera</i>	310	1	77	46	31	0	22	0	8-9	35	9	10	9	7
<i>Albulus vulpes</i>	130-170	3	69	42	27	0	18-19	0	33	33	8	10	9	6
ALPISURIDAE														
<i>Alpisurus ferox</i>	105-115	2	50-51	-	-	0	-	0	-	35-38	-	-	-	-
ANOPLOGASTERIDAE														
<i>Anoplogaster cornuta</i>	55-82	2	25-27	12	13-15	0	16-18	0	9	-	6	-	9	6-7
ANTENNARIIDAE														
<i>Antennarius maculatus</i>	41-60	2	18	10	8	3	12	0	6-7	9	0	4	5	0
<i>Antennarius ocellatus</i>	57	1	19	10	9	3	13	0	8	9	0	4	5	0
<i>Antennarius radiatus</i>	66-98	1	19	10	9	3	13	0	8	9	0	4	5	0
<i>Antennarius sanguineus</i>	33	1	19	10	9	3	13	0	7	9	0	4	5	0
ATRIIDAE														
<i>Atriax ferox</i>	70-81	1	18	10	8	3	12	0	7	9	0	4	5	0
<i>Phycis oxycephalus</i>	57-86	3	18	10	8	3	12	0	7	9	0	4	5	0
ARONNTINIDAE														
<i>Glossodon pygmaeus</i>	62-82	4	45	23	22	0	10-11	0	10	38-40	9-11	10	9	9-10
<i>Micromesistius microstoma</i>	195	1	47	31	16	0	12	0	10	40	10	10	9	10
ARIIDAE														
<i>Arcto ferox</i>	94-115	4	50-52	22	28-30	2	7	0	18-19	53-55	19-20	7	8	19-20
<i>Harringtonius marinus</i>	152-164	2	53-54	22	31-32	2	7	0	26-28	58-59	22-23	7	8	21
ASTROMYTHIIDAE														
<i>Astromythes simillimus</i>	42-85	4	53-55	37	16-18	0	11-12	0	19-20	32-35	8-9	9	5	7
ATELOPIDAE														
<i>Atelopus antillarum</i>	220-325	4	127-129	29-31	97-100	0	9	0	62-89	-	-	-	-	-
ATHENIINIDAE														
<i>Aluterus harringtonensis</i>	58-64	4	13-14	22-23	21	7-8	10	1	11	33-36	8-9	9	8	8-10
<i>Membras martinica</i>	54-92	3	15	19	24	7-8	11	1	10-12	32-35	7-8	9	8	8-10
<i>Pomadasys beryllinus</i>	30-37	4	11-12	15	23-24	6-8	12	1	17-18	-	9	8	8	9-10
<i>Modicus maculatus</i>	23-57	4	39-41	16-17	23-24	7-8	11	1	21-25	35-38	9-11	9	8	9-10
AULOPIDAE														
<i>Aulopus nasus</i>	133-195	2	46	33	15	0	15	0	11-12	34-35	8-9	10	9	7
AULOSTOMIDAE														
<i>Aulostomus maculatus</i>	90-225	2	57	21	36	10	28	0	29	20	3	7	7	3
BALISTIDAE														
<i>Aluterus heudelotii</i>	89-174	3	20	7	13	2	36-39	0	10-12	12	0	6	6	0
<i>Aluterus monoceros</i>	121	1	21	7	16	2	47	0	10-12	12	0	6	6	0
<i>Aluterus schoepfii</i>	95-165	4	23	7	16	2	33-37	0	10-12	12	0	6	6	0
<i>Aluterus scriptus</i>	55-110	4	21	7	14	2	44-47	0	10-12	12	0	6	6	0
<i>Halichoeres maculipinnis</i>	155-174	3	18	7	11	3	24-25	0	10-12	12	0	6	6	0
<i>Halichoeres maculatus</i>	105-180	3	18	7	11	3	29-30	0	27-28	12	0	6	6	0
<i>Cathartichthys pholus</i>	51-92	4	19	7	12	2	34-36	0	30-32	12	0	6	6	0
<i>Canthideres maculatus</i>	49-85	4	18	7	11	3	24	0	21-22	12	0	6	6	0
<i>Canthideres sufflamen</i>	59-90	4	18	7	11	3	26-28	0	23-25	12	0	6	6	0
<i>Monacanthus ciliatus</i>	66-88	6	19	6	13	2	30-32	0	31-32	12	0	6	6	0
<i>Macrourus hispidus</i>	72-92	6	19	7	12	2	32-34	0	32-34	12	0	6	6	0
<i>Macrourus heterocercus</i>	72-111	6	19	7	12	2	27-30	0	27-31	12	0	6	6	0
<i>Kanithichthys ringens</i>	40-65	4	18	7	11	2	29	0	24-25	12	0	6	6	0
BATHYCLUPIDAE														
<i>Bathyclupea schraderi</i>	109-125	4	31	10	21	1	9	1	36	33-35	8-9	9	8	8-9
BATHYPTEROIDAE														
<i>Bathypterus bigelowi</i>	105-113	4	49-51	24-25	25-26	0	12-13	0	8-10	27-29	4-5	10	9	4-5
BATRACHOIDAE														
<i>Opanus beta</i>	115-158	3	32	10	22	3	24-25	0	21-22	18	2	7	7	2
<i>Opanus pardus</i>	111-181	3	34-35	11	23	3	26	0	22	18	2	7	7	2
<i>Opanus tau</i>	121-180	3	34-35	11	23-24	3	27	0	22-23	18	2	7	7	2
<i>Forsterygion porosissimum</i>	62-147	4	44-55	12	32-33	2	36-37	0	33-34	15	2	6	7	1
<i>Thalassophryne maculosa</i>	35-59	2	26	6	16	2	18	0	16-17	16	2	6	7	1
BYLONIDAE														
<i>Ablennes hians</i>	70-350	4	93-95	60-62	33	0	23-25	0	26	25-28	5-7	7	8	5-6
<i>Platybelone argulus</i>	172-295	4	71	14-15	26-27	0	13	0	17-19	22-25	2-5	7	6	5-6
<i>Strongylura marina</i>	175-188	4	73-74	47-48	25-26	0	15-16	0	18-19	24-25	4-5	7	6	5-6
<i>Strongylura notata</i>	180-287	4	56-59	36-37	21-22	0	13-14	0	14-15	25-26	5-6	7	6	5-6
<i>Tylosurus acutus</i>	121-193	4	60-62	25-31	0	23-24	0	23-24	20-21	25-29	6-7	7	6	5-6
<i>Tylosurus crocodilus</i>	100-235	4	62	54-55	21-26	0	21-22	0	20-21	20-20	6-7	7	6	7-8
BYRCYCIDAE														
<i>Byrcynia decadactylus</i>	180	1	24	10	14	4	14	4	29	28	5	10	9	4
BLENNIDAE														
<i>Chasmodes bosquianus</i>	52-70	1	31-35	10	21-25	11	18-20	2	18-19	19	3	7	6	3
<i>Chasmodes sandwicensis</i>	14-60	4	33-34	10	23-24	11	17-18	2	17-18	17-19	2-3	7	6	2-3
<i>Halichoeres maculipinnis</i>	40-62	4	34	11	23	13	14-15	2	16	26-27	7	6	6	6-7
<i>Hypsophryne geminatus</i>	33-43	4	32-33	10	22-23	12	14-15	2	16-17	21-23	4-5	7	6	4-5
<i>Hypsoblennius herzbergi</i>	66-86	4	32-34	10	22-24	12	15	2	16-17	23-24	5-6	7	6	5-6
<i>Hypsoblennius forsteri</i>	85	1	33	10	23	12	15	2	17	23	5	7	6	5
<i>Hypsoblennius atlanticus</i>	59-65	5	33	10	23	12	20	2	21	27-29	7-8	7	6	7-8

TABLE 1.—Meristic characters of some marine fishes of the western North Atlantic Ocean.—Continued.

FAMILY Genus, species	Size range SL mm	Speci- mens exam- ined No.	VERTEBRATE			DORSAL FIN		ANAL FIN		CAUDAL FIN						
			Total	Precaudal	Caudal	Spines	Rays	Spines	Rays	Total	Dorsal secondary rays	Dorsal primary rays	Ventral primary rays	Ventral secondary rays		
Number																
BOTHIDAE																
<i>Anclylopetetta antillarum</i>	111-200	4	36	10	26	0	62-69	0	51-54	18	1	9	8	0	0	
<i>Anclylopetetta cyclodes</i>	107-153	4	34-35	10	24-25	0	65	0	49-51	18	1	9	8	0	0	
<i>Anclylopetetta dilecta</i>	126-154	4	36	10	26	0	72-75	0	51-58	18	1	9	8	0	0	
<i>Anclylopetetta kuhnerae</i>	110-220	4	36	10	26	0	76-79	0	60-63	18	1	9	8	0	0	
<i>Anclylopetetta microstomus</i>	94-218	4	35	10	25	0	62-71	0	53-55	18	1	9	8	0	0	
<i>Anclylopetetta quadrocellata</i>	69-195	4	31	11	26	0	68-73	0	54-57	18	1	9	8	0	0	
<i>Notiosebastes macrurus</i>	122-217	3	39-40	10	30	0	91-95	0	74-75	17	0	9	8	0	0	
<i>Eutrigla ocellatus</i>	70-134	4	35-37	10	25-27	0	79-85	0	61-64	17	0	9	8	0	0	
<i>Chascanopsetta prorigera</i>	133	1	55	16	39	0	115	0	86	17	0	9	8	0	0	
<i>Citharichthys amblypterus</i>	105	1	35	10	25	0	61	0	67	17	0	9	8	0	0	
<i>Citharichthys arcticus</i>	101-110	4	36-37	10	26-27	0	76-81	0	63-67	17	0	9	8	0	0	
<i>Citharichthys cornutus</i>	68-77	4	35-36	9-10	25-26	0	79-82	0	62-65	17	0	9	8	0	0	
<i>Citharichthys elongatus</i>	80-98	4	37	10	27	0	91-94	0	72-73	17	0	9	8	0	0	
<i>Citharichthys longimanus</i>	17	1	28	10	26	0	76	0	59	17	0	9	8	0	0	
<i>Citharichthys macrosp</i>	100-217	4	31-35	10	24-25	0	79-81	0	62-63	17	0	9	8	0	0	
<i>Citharichthys splioperius</i>	87-129	5	31-35	10	24-25	0	75-80	0	57-61	17	0	9	8	0	0	
<i>Cyclopetetta chilensis</i>	162-169	4	36-37	10	26-27	0	85-87	0	65-68	17	0	9	8	0	0	
<i>Cyclopetetta filamentos</i>	152-177	4	36-37	10	26-27	0	82-84	0	62-65	17	0	9	8	0	0	
<i>Diplodus argenteus</i>	69-120	4	37-38	10	27-28	0	74-80	0	64-66	17	0	9	8	0	0	
<i>Micromesistius australis</i>	80-100	4	31-35	10	24-25	0	76-79	0	56-61	17	0	9	8	0	0	
<i>Micromesistius frontalis</i>	112-186	4	37-38	10	27-28	0	61-64	0	45-51	17-18	0-1	9	8	0	0	
<i>Hippoglossus oblongus</i>	156-211	4	41-42	11	30-31	0	76-82	0	61-67	18-19	1	9	8	0	0	
<i>Microlene antillarum</i>	110-129	4	45-46	10-11	35-36	0	105-108	0	80-88	17	0	9	8	0	0	
<i>Microlene maculatus</i>	85-120	2	52-53	10	33-34	0	111-121	0	90-93	17	0	9	8	0	0	
<i>Microlene sexlineatus</i>	78-90	5	46-47	10-11	36	0	91-104	0	72-74	17	0	9	8	0	0	
<i>Paralichthys albulinus</i>	105-221	4	37	10	27	0	75-80	0	58-61	18	1	9	8	0	0	
<i>Paralichthys dentatus</i>	117-173	4	41-42	11	30-31	0	87-90	0	66-70	18	1	9	8	0	0	
<i>Paralichthys lethostigma</i>	95-213	4	37	10	27	0	82-90	0	64-71	18	1	9	8	0	0	
<i>Paralichthys squamiferus</i>	161-195	3	38	10	28	0	76-85	0	60-64	18	1	9	8	0	0	
<i>Synodus aculeatus</i>	111-160	4	31-36	11	23-25	0	80-81	0	50-54	17	0	9	8	0	0	
<i>Synodus punctatus</i>	92-111	4	30-35	10	24-25	0	74-81	0	60-63	17	0	9	8	0	0	
<i>Synodus sibiricus</i>	97-151	4	31-35	10	21-25	0	85-87	0	67-70	17	0	9	8	0	0	
<i>Synodus papillosum</i>	157-228	4	35-36	10	25-26	0	85-91	0	67-72	17	0	9	8	0	0	
<i>Trichopsetta caribbea</i>	84-156	23	11-14	10-11	31-33	0	95-102	0	75-81	17	0	9	8	0	0	
<i>Trichopsetta malmaea</i>	72-207	16	11-14	10-11	31-33	0	96-104	0	80-85	17	0	9	8	0	0	
<i>Trichopsetta orbicularis</i>	97-117	2	40	10	30	0	91-92	0	70-73	17	0	9	8	0	0	
<i>Trichopsetta ventralis</i>	75-113	18	40-41	10	30-31	0	89-95	0	69-75	17	0	9	8	0	0	
BRACHIONYCTIDAE																
<i>Malacanthus pluridens</i>	222	1	24	10	14	6	53	1	51	39	12	8	7	12		
BRACHYMACRODIDAE																
<i>Brammaceras atlanticus</i>	42-48	4	47-49	13	34-36	0	141-146	0	46-47	31-32	-	-	-	-		
CALLIONYMIDAE																
<i>Callionymus agassizii</i>	102-132	4	21	7	14	4	8	0	7	15	3	5	6	2		
<i>Dracanties acanthopoma</i>	88	1	23	8	15	3	14	0	13	16	3	6	6	1		
<i>Dracanties oregona</i>	70-103	3	23	8	15	3	14	0	13	16	3	6	6	1		
CARPODIDAE																
<i>Antigonias capros</i>	144-187	4	22	10	12	8	33-35	3	30-32	18-19	4	6	6	3		
<i>Antigonias combattus</i>	85-115	4	22	10	12	9	28-29	3	26-27	18-19	3-4	6	6	3		
CARANGIDAE																
<i>Alectis crinita</i>	71-91	4	24	10	11	7-8	19	3	16	35-36	9-10	9	8	9		
<i>Alectis maculata</i>	113-140	4	24	10	11	9	25-27	3	22-23	33-34	8-9	9	8	8		
<i>Caranx cryps</i>	191-212	4	25	10	15	9	23	3	19-20	33-34	8-9	9	8	8		
<i>Caranx hippos</i>	99-104	4	24	10	14	9	19-20	3	16-17	34	8-9	9	8	8		
<i>Caranx latus</i>	51-160	4	24	10	14	9	20-21	3	17	33-34	8-9	9	8	8		
<i>Caranx ruber</i>	82-137	4	24	10	14	9	27-28	3	26-27	32-35	8-9	9	8	7-9		
<i>Chloroscombrus chrysurus</i>	68-125	4	24	10	14	9	26-27	3	26-27	32-35	8-9	9	8	7-9		
<i>Dactyloscopus maculatus</i>	100-120	4	24	10	14	9	24-25	3	24-25	35-36	9-10	9	8	9-10		
<i>Dactyloscopus maculatus</i>	122-155	4	25	10	15	9	24-26	2	25-26	35-36	9-10	9	8	9-11		
<i>Plagiotremus bipinnatus</i>	60-90	4	24	10	14	7	25-26	2	18-1	31-39	9-11	9	8	10-11		
<i>Hebridaxanthus amblyrhynchus</i>	11-51	2	26	10	16	9	28-29	3	21-25	36-38	9-10	9	8	8-9		
<i>Muraenesox duorarctatus</i>	21-85	1	25	10	15	6-7	26	3	19-20	32-35	9-10	9	8	6-8		
<i>Solea dumetieri</i>	117-205	4	24	10	14	9	21-22	3	17-18	31-33	7-8	9	8	7		
<i>Solea rivulosa</i>	117-235	6	24	10	14	8	28-32	3	20-21	36-37	8-9	9	8	8-12		
<i>Solea solea</i>	167-215	4	24	11	13	9	35-37	3	29-31	36-37	11-13	9	8	9-11		
<i>Trachinotus carolinus</i>	125-182	4	24	10	14	7	24-25	3	21-22	32-33	8	9	8	7-8		
<i>Trachinotus cayenneensis</i>	327	1	24	10	14	6	26	2	27	32	8	9	8	7		
<i>Trachinotus falcatus</i>	39-66	4	24	10	14	7	19-20	3	16-18	30-31	7	9	8	7		
<i>Trachinotus fuscus</i>	39-66	4	24	10	14	7	19	3	17-18	32-33	7-8	9	8	7		
<i>Trachinotus fuscus</i>	120-150	4	24	10	14	9	21-31	3	27-28	35-37	9-10	9	8	9-10		
<i>Trematocranus leucostomus</i>	117-160	4	24	10	14	9	21-22	3	16-16	34-34	8-9	9	8	7-8		
CARPIDAE																
<i>Carapus bermudensis</i>	126-165	3	118-122	16	102-106	0	-	0	-	0	0	0	0	0	0	
CENTRISCIDAE																
<i>Macrorhamphus scolopax</i>	68-115	4	24	8	15	7	10-11	0	18-19	27-28	9-10	4	5	9-10		
CENTROPODIDAE																
<i>Centropristes eniferus</i>	122-280	3	24	10	14	9	9-10	3	6	36-38	10-11	9	8	9-10		
<i>Centropristes undicarinatus</i>	56-168	5	24	10	14	9	10	3	37-40	11-12	9	8	9	9-11		
CHATONINOTIDAE																
<i>Chatodon aya</i>	56-90	4	24	10	14	14	12-14	3	11-15	24-25	4-5	9	8	3-4		
<i>Chatodon capistratus</i>	109-167	3	24	10	14	14	12-13	3	15-20	23	3	9	8	3-5		
<i>Chatodon ocellatus</i>	99-130	4	24	10	14	14	12-13	3	16-17	23	3	9	8	3-5		
<i>Chatodon sedentarius</i>	82-99	4	24	10	14	14	13-14	3	21-23	23	3	9	8	3-5		
<i>Chatodon striatus</i>	28-92	4	24	10	14	14	12	3	20-21	23-24	3-4	9	8	3-5		
<i>Chatodon striatus</i>	96-140	4	24	10	14	14	14	3	15-19	25	4	9	8	3-5		
<i>Chatodon striatus</i>	62-183	3	24	10	14	14	14	3	20-20	25	4	9	8	3-5		
<i>Chatodon striatus</i>	113-173	4	24	10	14	14	13-14	3	17-19	25	4	9	8	3-5		
<i>Foafoanthus arcuatus</i>	77-128	4	24	10	14	14	10	3	28-29	3	22-23	25	4	9	8	
<i>Foafoanthus aureus</i>	236-250	2	24	10	14	9	9	3	30-31	3	23-24	25	4	9	8	
<i>Foafoanthus aculeatus</i>	52	1	24	10	14	13	13	3	16	24	4	9	8	3-4		
CHAULIODONTIDAE																
<i>Chauliodus sloanei</i>	115-185	4	50-52	-	-	0	5-6	0	11-12	-	7	10	9	-		

TABLE 1.—Meristic characters of some marine fishes of the western North Atlantic Ocean.—Continued.

FAMILY Genus, species	Size range SL	Speci- mens exam- ined	VERTEBRAE			DORSAL FIN		ANAL FIN		CAUDAL FIN					
			Total	Precaudal	Caudal	Spines	Rays	Spines	Rays	Total	Dorsal secondary rays	Dorsal primary rays	Ventral primary rays	Ventral secondary rays	
	mm	No.	—	—	—	Number	—	—	—	—	—	—	—	—	
CHAUNACIDAE															
<i>Chauax pictus</i>	61-123	4	19-20	12	7-8	1	11-12	0	7	9	0	4	5	0	
CHILODONTPTERIDAE															
<i>Apogon aurolineatus</i>	40	1	24	10	14	7	9	2	8	29	6	9	8	6	
<i>Apogon binotatus</i>	30-60	3	24	10	14	8	9	2	7-8	31-32	7-8	9	8	7	
<i>Apogonichthys affinis</i>	39-51	3	24	10	15	7	9	2	7-9	32-34	7	9	8	5-7	
<i>Apogonichthys olivaceus</i>	103-135	4	25	10	15	8	10	2	9	30-31	10-12	9	8	10-11	
<i>Apogonichthys rostratus</i>	95-112	4	25	10	15	8	9-10	2	9	32-37	9-11	9	8	7-10	
<i>Phaeoptyx comblinei</i>	34-46	3	24	10	14	7	9	1-2	21-31	5-7	9	8	6	5-7	
<i>Phaeoptyx pigmentata</i>	44	1	24	10	14	7	9	2	8	30	7	9	8	6	
<i>Phaeoptyx pseudomaculatus</i>	78-87	4	24	10	14	8	9	2	8	30-32	7-8	9	8	6-7	
<i>Phaeoptyx quadrivittatus</i>	142	1	24	10	14	8	9	2	8	31	7	9	8	7	
<i>Synagrops bellus</i>	118-160	4	25	10	15	10	9	2	7	35-38	10	9	8	8-9	
<i>Synagrops pseudochirolepis</i>	83-89	4	25	10	15	10	10	2	9	41-42	12-13	9	8	12-13	
<i>Synagrops spinosus</i>	80-125	4	25	10	15	10	8-9	2	7	35	9	9	8	9	
CHLOROPHTHALMIDAE															
<i>Chlorophthalmus agassizii</i>	107-127	7	14-18	18	28-30	0	10-12	0	8	43-46	13-14	10	9	11-13	
<i>Parasudis triculenta</i>	135-140	4	39	17	22	0	10-10	0	8-9	40-42	11-13	10	9	11-13	
CLINIDAE															
<i>Labrisomus gunnii</i>	30-57	3	35	11	24	19	10-11	2	18-19	29	8	7	6	8	
<i>Labrisomus nuchifasciatus</i>	90-110	4	34	11	23	18	12	2	19-19	28-30	8-9	7	6	7-8	
<i>Starksia y-lineata</i>	12-14	2	31	10	21	19	7	2	11-15	-	-	-	-	-	
CLUPIDAE															
<i>Aluterus aestivalis</i>	137-215	6	47-51	11-16	33-35	0	17-18	0	16-20	32-34	7-8	10	9	6-7	
<i>Aluterus mediterraneus</i>	138	1	51	17	37	0	19	0	22	35	9	10	9	7	
<i>Aluterus rapidoalbus</i>	103-121	5	56-57	18-19	37-38	0	16-19	0	19-21	33-34	7-8	10	9	7	
<i>Brevicottia punctata</i>	190	1	54	14	30	0	20	0	21	36	9	10	9	8	
<i>Brevicottia patronus</i>	21-170	5	45-46	16	29-30	0	20-21	0	21-23	34-36	8-9	10	9	7-8	
<i>Brevicottia smithi</i>	72-82	5	45-46	14-15	30-31	0	19-20	0	21-21	33-35	8	10	9	6-8	
<i>Brevicottia tyrranum</i>	110-233	3	45	18-19	29-30	0	20-22	0	21-24	32-35	7-9	10	9	6-7	
<i>Clinus heteropterus</i>	190-247	4	55-57	23-25	37-38	0	17-19	0	17-18	37-41	10-13	10	9	8-9	
<i>Dicentrarchus labrax</i>	137-205	4	110-120	12-13	35-39	0	13-15	0	22-25	35-37	9-11	10	9	8-9	
<i>Dicentrarchus labrax</i>	37-62	7	13-14	11-13	30-32	0	11-16	0	22-24	34-35	9	10	9	6-7	
<i>Hirundichthys radula</i>	107-125	5	46-50	15-17	32-34	0	16-21	0	11-12	31-32	6-7	10	9	6	
<i>Hirundichthys pensacolae</i>	64-77	4	40-41	12-11	27-29	0	16-18	0	17-18	33-35	8-9	10	9	6-7	
<i>Junkinella laevipinnis</i>	27-47	8	38-42	19-21	19-21	0	10-12	0	13-15	23-24	3-4	9	8	3	
<i>Ophistionchus ocellatus</i>	51-192	9	45-49	12-13	32-36	0	20-22	0	20-25	34-35	9	10	9	6-7	
<i>Sardinella anchovia</i>	23-29	6	45-47	16	29-31	0	16-19	0	16-17	34	8	10	9	7	
GURYPHARIDAE															
<i>Gymnopharina squamis</i>	77-100	4	33	11	19	0	51-54	0	24-27	40-41	11-12	9	8	12	
<i>Gymnopharina bipurpus</i>	91-130	4	31	13-14	17-18	0	58-60	0	27-28	39-43	11-13	9	8	10-13	
GURYPHARINOIDAE															
<i>Colororhynchus carmineus</i>	170-205	2	75-78	12	63-66	0	10	0	110	-	-	-	-	-	
<i>Neurolophus bairdii</i>	350	1	-	11	-	2	-	0	-	-	-	-	-	-	
CYCLOPHTERIDAE															
<i>Cyclopterus lumpus</i>	387	1	29	11	18	6	10	0	11	15	3	5	5	2	
GYNOGLOSSIDAE															
<i>Synodus civitatus</i>	100-138	4	48	9	36-40	0	80-91	0	72-75	12	0	6	6	0	
<i>Synodus intermedius</i>	128-181	4	48-49	9	39-40	0	80-92	0	71-76	10-11	0	5-6	5-6	0	
<i>Synodus marginatus</i>	100-112	4	52-53	9	44-45	0	92-96	0	81-84	12	0	6	6	0	
<i>Synodus niger</i>	155-200	2	43	9	34	0	75-76	0	60	10-11	0	5-6	5-6	0	
<i>Synodus niger</i>	93-106	4	47-48	9	38-39	0	84-87	0	68-72	12	0	6	6	0	
<i>Synodus plagiatus</i>	121-135	4	46-48	9	37-39	0	86-89	0	70-72	10	0	5-6	5-6	0	
<i>Synodus plagiatus</i>	147-194	4	50-52	9	41-43	0	91-96	0	78-83	11-12	0	6-6	6-6	0	
<i>Synodus pusillus</i>	91-118	3	53-54	9	44-45	0	95-99	0	83-85	12	0	5	5	0	
<i>Synodus urospilus</i>	96	1	53-54	9	35	0	85	0	69	11	0	5	6	0	
CYPRIODONIDAE															
<i>Cyprinodon variegatus</i>	34-54	1	26-27	12	14-15	0	12-13	0	11-12	28-29	-	-	-	-	
<i>Floridichthys carpio</i>	48	1	23	9	14	0	11	0	9	31	-	-	-	-	
<i>Fundulus grandis</i>	65-111	4	33-35	15-16	18-20	0	11-12	0	11	38-42	-	-	-	-	
<i>Fundulus heteroclitus</i>	62-72	4	33-34	14	19-20	0	11-12	0	10-11	34-40	-	-	-	-	
<i>Fundulus majalis</i>	21-32	10	31-32	12-13	18-20	0	10-11	0	10-12	31-33	-	-	-	-	
<i>Fundulus notatus</i>	30-65	4	35-36	15	19-20	0	12-11	0	10-12	37-40	-	-	-	-	
<i>Fundulus notatus</i>	14-81	5	35-36	15	20-21	0	12-13	0	11-12	36-40	-	-	-	-	
DACTYLOPTERIDAE															
<i>Dactylopterus volitans</i>	110-162	4	22	8	14	-	8	0	6	15	3	5	5	2	
DIOCHYTIDAE															
<i>Chloroclysterus schlegeli</i>	60-115	5	18-20	-	-	0	10-12	0	9-11	9	0	4	5	0	
<i>Micromesistius holocanthus</i>	97-125	3	-	-	-	0	12-15	0	12-15	9	0	4	5	0	
<i>Micromesistius hystrix</i>	37-168	3	-	-	-	0	15	0	16	9	0	4	5	0	
DIRETMIDAE															
<i>Diretmus argenteus</i>	82-95	4	29-30	13	16-17	0	25-26	0	20-21	29	5	10	9	5	
ECHEMIDAE															
<i>Echeneis naucrates</i>	210-268	3	30	14	16	0	34-37	0	32-35	37-40	10-11	9	8	10-12	
<i>Echeneis naucrates</i>	103-137	2	30	14	16	0	37	0	33	40	13	9	8	10	
<i>Phtheirichthys lineatus</i>	50-61	2	36-39	18	20-21	0	35	0	35	39	11	9	8	11	
<i>Remora remora</i>	74-156	6	27	12	15	0	21-26	0	22-24	39-43	11-13	9	8	11-13	
ELMOTTIDAE															
<i>Doviziotus maculatus</i>	76-77	2	27	12	15	6	8	1	10	32-33	9	8	7	8-9	
ELLOPIDAE															
<i>Platycephalus saurus</i>	180-233	4	76-80	55-56	24	0	26-28	16	0	18-19	36-37	9-11	10	9	7-8
<i>Platycephalus atlanticus</i>	75-115	3	55-56	33-34	22	0	26-28	16	0	24-25	37-38	7	10	9	6-7
EPALIGNEITHYIDAE															
<i>Epaleichthys atlanticus</i>	77	1	26	11	15	11	11	3	9	40	12	9	8	11	

TABLE 1.—Meristic characters of some marine fishes of the western North Atlantic Ocean.—Continued.

FAMILY Genus, species	Size range SL mm	Speci- mens exam- ined No.	VERTEBRAE			DORSAL FIN		ANAL FIN		CAUDAL FIN					
			Total	Precaudal	Caudal	Spines	Rays	Spines	Rays	Total	Dorsal secondary rays	Dorsal primary rays	Ventral primary rays	Ventral secondary rays	
			Number												
PRINCIPALIDAE															
<i>Anchoa cubana</i>	48-67	3	40-44	21-24	19-21	0	14-15	0	22	32-34	7	10	9	6-8	
<i>Anchoa hispanica</i>	65-75	4	42-43	21-22	20-21	0	14-15	0	20-22	33-36	7-9	10	9	7-8	
<i>Anchoa lycoperis</i>	51-82	3	41-43	21-22	20-21	0	14-15	0	21-22	32-35	7-8	10	9	6-8	
<i>Anchoa mitchilli</i>	57-67	4	40-41	19	21-22	0	14-15	0	25-27	35-36	9	10	9	7-8	
<i>Anchoa spinifera</i>	117-133	4	42-43	17	25-26	0	15-16	0	38-39	37-39	10-11	10	9	8-9	
<i>Anchoa squalida</i>	55	1	43	22	21	0	14-15	0	21	30	6	10	9	5	
<i>Anchoa squalidostole</i>	63-70	4	40	19	21	0	14-15	0	22-24	31-36	6-9	10	9	6-8	
<i>Anchoa vulgaris</i>	28-35	4	43-44	-	-	0	11	0	0	0	-	10	9	5	
<i>Cetengraulis edentulus</i>	117	1	41	21	21	0	16	0	25	35	8	10	9	5	
<i>Lycengraulis grossidens</i>	140-145	2	43	20	23	0	15	0	27	35	6	10	9	5	
EPHIPPIDAE	<i>Chaetodipterus faber</i>	48-103	4	24	10	14	9	21-23	3	17-18	27-29	5-6	9	8	5-6
POCOCYPTIDAE															
<i>Cyprinurus comatus</i>	41-162	4	42	26-27	15-16	0	12	0	7-9	26-28	5-6	7	8	6-7	
<i>Cyprinurus cyanopterus</i>	49-100	4	44-51	30-31	14-15	0	12-13	0	9-10	27-29	5-6	7	8	7-8	
<i>Cyprinurus exilisimus</i>	45-166	2	44-45	30	14-15	0	15	0	10	27-28	5-6	7	8	7	
<i>Cyprinurus furcatus</i>	58-105	3	45-46	29-31	14-15	0	13-14	0	10	29-33	6-9	7	8	8-9	
<i>Cyprinurus heterodon</i>	197-218	4	46-47	14	15-16	0	13-14	0	9-10	26-29	5-6	7	8	6-8	
<i>Glyptothorax valens</i>	190	1	72	16	26	0	22	0	23	23	4	7	8	4	
<i>Eucinostomus oblongirostris</i>	157-177	3	44-45	26-27	18	0	11	0	14	26-28	5-6	7	8	6-7	
<i>Hemiramphus balao</i>	57-70	4	51-56	38-39	16-17	0	13-14	0	11-13	21-27	5-6	7	8	4-6	
<i>Hemiramphus brasiliensis</i>	50-90	4	52-53	35-37	16-18	0	13-15	0	12-13	24-25	5-6	7	8	4-5	
<i>Hirundichthys affinis</i>	121-210	3	45-47	29	16-18	0	10-11	0	11-12	30	6	7	8	7	
<i>Hirundichthys roncadori</i>	212	1	45	29	16	0	12	0	12	28	6	7	8	7	
<i>Macrourus macrurus</i>	137-173	4	51-52	33-34	17-18	0	14-15	0	16	23-27	4-5	7	8	4-6	
<i>Myoxocephalus microlepis</i>	100-134	4	50	18-19	31-32	0	14-15	0	15-16	23	4	7	8	4	
<i>Paracocotus brachypterus</i>	97-115	4	39	23	16	0	12	0	11-14	23	4	7	8	4	
<i>Prognathodes gibbifrons</i>	30-73	4	43-45	27-29	15-16	0	9-12	0	8-9	26-27	4-5	7	8	7	
FISTULARIIDAE															
<i>Fistularia laticeps</i>	210-420	3	28-33	-	-	0	16	0	11-15	26	6	7	7	6	
<i>Fistularia tabacaria</i>	215-470	2	30-35	-	-	0	15	0	11-15	26	6	7	7	6	
OJODIDAE															
<i>Enchelyopus cimbricus</i>	137-230	4	51-52	16	35-36	0	45-46	0	24, 26, 27-23	30-34	-	-	-	-	
<i>Melanogrammus aeglefinus</i>	285	2	53-55	20-21	33-34	0	15, 22-23	0	37-38	57-58	-	-	-	-	
<i>Merluccius albidus</i>	165-185	4	51-52	25	25-27	0	12, 13, 26-37	0	39-42	34-36	-	-	-	-	
<i>Merluccius productus</i>	204	1	44	26	27-28	0	12, 13, 27	0	36-37	26-31	-	-	-	-	
<i>Myxodes charrus</i>	128-246	4	47-49	32-34	15-16	0	10, 15-20	0	45-51	30	-	-	-	-	
<i>Myrophis chrysos</i>	60-105	4	48	15	33	0	9-10, 51-58	0	45-51	30	-	-	-	-	
<i>Myrophis cirratus</i>	317-337	3	51	16	35	0	10, 62-64	0	54-55	32	-	-	-	-	
<i>Myrophis earlii</i>	282	1	46	15	31	0	10, 59	0	53	30	-	-	-	-	
<i>Myrophis regius</i>	82-177	4	45-46	13-14	31-33	0	8-9, 17-51	0	45-50	30-32	-	-	-	-	
<i>Myrophis tenue</i>	80-115	4	50-57	14-15	42	0	6, 57-59	0	53-57	-	-	-	-	-	
OPRIMIDIIDAE															
<i>Oxyphylax serpens</i>	210	1	53	34	19	32	12-8	3	29	4	9	8	8	8	
<i>Lepidocyttus flavobrunneus</i>	373	1	32	17	15	9	19-5	3	12-14	37	10	9	8	10	
<i>Neosinimula orientalis</i>	115-167	4	32	16	16	17	18	3	18	35-37	9-10	9	8	9-10	
<i>Nesarchus naputus</i>	215-245	3	36	22	14	22-23	22-23	3	18-19	33-34	7-8	9	8	9	
<i>Kuhnia praticana</i>	270-310	3	32	16	16	13-15	18-19-2	2	17-18-2	34-37	9-10	9	8	8-10	
GERRESIDAE															
<i>Diplodus olithostomus</i>	160-163	2	24	10	14	9	10	3	8	36	11	9	8	10	
<i>Diplodus rhombus</i>	60-105	4	24	10	14	9	10	3	9	37-38	10-11	9	8	10	
<i>Eucinostomus argenteus</i>	123-145	4	24	10	14	9	10	3	7	37-38	10-11	9	8	10	
<i>Eucinostomus gula</i>	107-125	4	24	10	14	9	10	3	7	37-38	10-11	9	8	10	
<i>Eucinostomus hoyi</i>	128	1	24	10	14	9	10	2	8	36	10	9	8	9	
<i>Eucinostomus cinereus</i>	180	1	24	10	14	9	10	3	7	33	6	9	8	8	
OONIUSOICIDAE															
<i>Gobiosox strumosus</i>	36-49	4	25-26	14	11-12	0	11	0	10	-	-	-	-	-	
OONIIDAE															
<i>Gobionellus hololeucus</i>	35	1	26	10	16	6	11	0	12	32	9	8	7	8	
<i>Gobionellus shufeldti</i>	51	1	26	10	16	6	12-13	0	13	32	8	7	7	7	
<i>Gobiosoma boscii</i>	29-50	4	27	11	16	7	12-13	0	11	30-32	8-9	8	7	8-7	
<i>Gobiosoma ginsburgi</i>	28	1	27	11	16	7	12	0	11	32	8-9	8	7	8-8	
<i>Gobiosoma robustum</i>	25-31	4	27	11	16	7	11-12	0	10-12	31-32	8-9	8	7	7-9	
<i>Microgobius gulosus</i>	31-45	4	27	11	16	7-8	16-17	0	17-18	30	8-8	8	7	7-7	
ONCOSTOMATIDAE															
<i>Ariommus atlanticus</i>	60-73	4	46-47	16	30-31	0	10-11	0	-	-	-	10	9	-	
<i>Monopterus albus</i>	51-70	2	37-38	17	20-21	0	19	0	29	-	-	10	9	-	
<i>Oncopterus bathynphilus</i>	127	2	36-39	17	21-22	0	13	0	24	-	-	10	9	-	
<i>Oncopterus elongatus</i>	135-215	4	41	17	24	0	13-14	0	29-31	38-41	10-12	10	9	9-10	
<i>Maurolicus muelleri</i>	13	1	32-33	15	20-21	0	12-13	0	-	-	-	10	9	-	
<i>Polyprion oxygeneios</i>	122-165	4	45	17	21	0	11-12	0	28-31	57	-	10	9	-	
<i>Triplophysa hemimura</i>	172-183	2	59	19	10	0	10-11	0	-	-	-	10	9	-	
GRANOCOLEPIDIIDAE															
<i>Grammicolepis brachiusculus</i>	78-90	4	36-37	10	26-27	6	27-29	2	27-29	17	1	7	8	1	
<i>Tenolepidichthys dalgleishi</i>	70-75	4	37-38	10	27-28	5	27-29	2	26-29	17	1	7	8	1	
GRANOSITIDAE															
<i>Synodus biocellatus</i>	61-70	4	25	10	15	2	25-26	0	15-16	21-26	4-5	9	8	3-4	
<i>Synodus maculatus</i>	83-152	4	24	10	14	3	24-25	0	15-16	25-26	4-5	9	8	4	
<i>Synodus saponaceus</i>	50-175	4	24	10	14	3	24-25	0	17	21-25	3-4	9	8	4	
HOLOCENTRIDAE															
<i>Corniger sinuosus</i>	103-121	4	27	11	16	12-13	13-14	4	11	26-29	5	10	9	-	
<i>Holocentrus maculipinnis</i>	111-200	4	27	11	16	11	11-12	4	10	30	6	10	9	-	
<i>Holocentrus coruscus</i>	78-108	4	27	11	16	11	11-12	4	7-8	30	6	10	9	-	
<i>Holocentrus rufus</i>	48-153	2	27	11	16	11	11-12	4	7	30	6	10	9	-	
<i>Holocentrus vexillarius</i>	61-65	4	27	11	16	11	11-12	4	9-10	29-30	6	10	9	-	
<i>Myripristes jacchus</i>	68-115	4	26	11	15	11	11-12	4	9	30-31	6	10	9	-	
<i>Ostichthys trachycnemis</i>	74-105	4	26	11	15	12	12-13	4	12-13	27-28	5	10	9	3-4	
ISTIOPHORIDAE															
<i>Tetropodus albipinnis</i>	62-80	4	23-24	12	11-12	4-5	16-18	6-7	16-18	6-8	35-38	10	9	8-11	
KYPHOIDAE															
<i>Kyphosus incisor</i>	34-50	4	26	10	16	10-11	13-14	3	13	34	9	9	8	8	
<i>Kyphosus septicrix</i>	33-53	4	26	10	16	11	13-14	3	11	33	9	9	8	8	

TABLE 1.—Meristic characters of some marine fishes of the western North Atlantic Ocean.—Continued.

FAMILY Genus, species	Size range cm	Speci- mens exam- ined	VERTEBRAE			DORSAL FIN		ANAL FIN		CAUDAL FIN					
			Total	Precaudal	Caudal	Spines	Rays	Spines	Rays	Total	Dorsal secondary rays	Dorsal primary rays	Ventral primary rays	Ventral secondary rays	
			No.	No.	No.										
LABRIDAE															
<i>Bodianus pulchellus</i>	187-215	3	28	11	17	12	10	3	11-12	32-33	9-10	7	7	9	
<i>Cirrhiticus parvus</i>	10	1	28	11	17	12	10	3	12	31-35	12	7	7	11	
<i>Halichoeres maculipinnis</i>	115-152	1	28	11	17	11	10	3	10	31-35	10-11	7	7	10-11	
<i>Halichoeres bivittatus</i>	120-137	2	25	10	15	9	11	3	12	26	6	7	7	6	
<i>Halichoeres maculipinna</i>	123-140	4	25	10	15	9	11	3	12	26-27	6-7	7	7	6	
<i>Halichoeres radiatus</i>	57-83	2	25	10	15	9	11	3	12	26	6	7	7	6	
<i>Hemipteronotus martinicensis</i>	98	1	25	10	15	9	11	3	12	21-23	4-5	7	7	4	
<i>Hemipteronotus maximus</i>	118-152	1	25	9	16	8-9	12-13	4	12	26-28	6-7	7	7	6	
<i>Hemitaurulus erithrinus</i>	112-122	1	30	13	17	11	11	3	10-11	28	6	6	7	6	
<i>Thalassoma bifasciatum</i>	87	1	25	10	15	8	13	3	11	25	6	7	7	6	
<i>Thalassoma nitidum</i>	41-55	5	25	10	15	8	12-13	3	10-11	24-26	5-6	7	7	5-6	
LOBIIDAE															
<i>Lobotes surinamensis</i>	19-40	4	24	11	13	12	15-16	3	11	23-25	3-5	9	8	3	
LOPHIIDAE															
<i>Lophius americanus</i>	86-98	2	25-26	14	11-12	-	-	0	9-10	-	-	-	-	-	-
LUTJANIDAE															
<i>Apalius dentatus</i>	202	1	24	10	14	10	9	3	8	42	13	9	8	12	
<i>Petenia oculatus</i>	95-160	3	24	10	14	10	11	3	8	39-41	12-13	9	8	10-11	
<i>Petenia spilopterus</i>	105-137	1	24	10	14	10	11	3	8	35-36	9-10	9	8	9-10	
<i>Petenia obscurus</i>	32-99	4	24	10	14	10	11	3	8	31-33	7-8	8	8	7-8	
<i>Petenia aya</i>	94-172	7	24	10	14	10	11	3	8	35-37	9-10	9	8	8-10	
<i>Petenia buccanella</i>	92-117	4	24	10	14	10	11	3	8	36-37	10	9	8	9-10	
<i>Petenia toca</i>	81-170	4	24	10	14	10	11	3	8	31-33	8	9	8	8-8	
<i>Petenia mahogoni</i>	86-150	4	24	10	14	10	11	3	8	33-34	8-9	9	8	8-9	
<i>Petenia sagittaria</i>	100-155	4	24	10	14	10	11	3	8	34-36	9-10	9	8	9-10	
<i>Petenia vivax</i>	95-113	3	24	10	14	10	11	3	8	37-38	10-11	9	8	10	
<i>Petenia chryseus</i>	157-173	4	24	10	14	10	11	3	8	34-35	9-9	9	8	8-9	
<i>Pristipomoides aquilonaris</i>	88-178	2	24	10	14	10	11	3	7-8	39-41	11-12	9	8	10-12	
<i>Pristipomoides freycineti</i>	135-155	4	24	10	14	10	11	3	8	39-40	12	9	8	10-11	
<i>Pristipomoides macrocephalus</i>	55-173	7	24	10	14	10	11	3	8	41-43	11-13	9	8	12-13	
<i>Sphoeroides aurorubens</i>	123-144	4	24	10	14	12	11	3	8	36-38	10-11	9	8	9-10	
<i>Synodus synodus</i>	111-123	4	25	10	15	9	10	3	7	40-42	12-13	9	8	11-12	
MALACOSTEIDAE															
<i>Malacosteus niger</i>	90	1	47	-	-	0	18	0	21	-	-	-	-	-	-
MICRODESMIDAE															
<i>Microdesmus carri</i>	31-34	2	67-68	37	30-31	0	0	0	-	23	5	7	6	5	
MORIDAE															
<i>Brama brama</i>	135-165	4	50-51	17	33-34	0	10,53-56	0	56-62	34-37	-	-	-	-	-
<i>Lampanyctus batrachium</i>	90-185	2	59	17	42	0	5-5,59	0	67	28	-	-	-	-	-
<i>Physculea tolva</i>	115-122	4	48-49	14	34-35	0	10-11,50-58	0	60-64	23-24	-	-	-	-	-
MUGILIDAE															
<i>Mugil cephalus</i>	20-30	3	25	12	13	5	8	2	10	29-31	9-10	7	7	9-10	
<i>Mugil cephalus</i>	105-155	4	25	12	13	5	8	2	6	28-30	7-8	7	7	7-8	
<i>Mugil curema</i>	84-105	4	24	12	12	5	8	2	9	28-29	7-8	7	7	7-8	
<i>Mugil incilis</i>	35	2	24	12	12	5	7-8	3	9	29-30	8	7	7	7-8	
<i>Mugil trichodon</i>	58-105	4	24	12	12	5	7-8	3	8-9	28-29	7	7	7	7-8	
MULLIDAE															
<i>Menticirrhus martinicensis</i>	90-131	4	24	10	14	9	8	2	6	31	8	7	8	8	
<i>Mullus auratus</i>	97-126	3	24	10	14	9	8	2	6	33	9	8	7	9	
<i>Pseudupeneus maculatus</i>	113-155	4	24	10	14	9	8	2	6	34-35	10	8	7	9-10	
<i>Upeneus parvus</i>	100-134	4	24	10	14	9	8	2	6	31	8	7	8	7	
MYTICOPHIDAE															
<i>Centrobranchus nigropinnatus</i>	24-27	4	36	16	20	0	9-11	0	16-18	30-31	6	10	9	5-6	
<i>Diaphus antecedens</i>	117-162	4	35	16	19	0	15	0	15-17	32-33	6-7	10	9	5-6	
<i>Diaphus intermedius</i>	51-80	3	35-36	16	19-20	13-14	0	0	14-16	30-31	6	10	9	5-6	
<i>Diaphus longirostris</i>	68-97	5	34	16	18	15	0	0	14	31-32	6-7	10	9	6	
<i>Diaphus refractinus</i>	68-81	3	35	16	18	15	0	0	14-15	31-32	6-7	10	9	6-7	
<i>Diaphus termitophilus</i>	48-51	4	35	16	19	13-14	0	0	14-15	32-33	7	10	9	6-7	
<i>Onychichthys coccoides</i>	20-47	4	39-40	15	24-25	11	0	0	21-23	31-32	6	10	9	6-7	
<i>Onychophanes guentheri</i>	11	1	35	16	21	12	0	0	20	34	6	10	9	7	
<i>Onychophanes intermedius</i>	100	1	34	16	18	12	0	0	11	32	7	10	9	6	
<i>Myctophum affine</i>	62-76	3	35-37	15	20-22	13	0	0	18-20	34-36	8-9	10	9	7-8	
<i>Myctophum armatum</i>	26-68	4	37	15	22	13	0	0	17-18	35-37	8-9	10	9	8-9	
<i>Myctophum nitzubium</i>	55-68	4	38	15	23	13	0	0	19-20	35-37	8-9	10	9	8-9	
<i>Myctophum obtusirostris</i>	42-61	2	35	15	20	13	0	0	18	34-35	8	10	9	7-8	
<i>Notoscopelus elongatus</i>	25	1	38	17	21	21	0	0	14	32-33	12	10	9	13	
<i>Synaphobranchus rufimarginatus</i>	51-52	2	37	15	22	0	0	0	20-21	36-37	9	10	9	8-9	
NEOSCOPELIDAE															
<i>Neoscopelus macrolepidotus</i>	117-136	4	31-32	14	17-18	0	13	0	12-13	34	8	10	9	7	
OCCIDENTALIDAE															
<i>Dibranchus atlanticus</i>	75-112	3	18	5	12	-	-	-	-	-	-	-	-	-	-
<i>Histiophryne aculeata</i>	67-87	17	19	-	-	-	-	-	-	-	-	-	-	-	-
<i>Histiophryne maculata</i>	110-127	4	19	-	-	-	-	-	-	-	-	-	-	-	-
<i>Histiophryne parvula</i>	55-95	4	18	-	-	-	-	-	-	-	-	-	-	-	-
<i>Histiophryne vesperilio</i>	100-130	4	17-18	-	-	-	-	-	-	-	-	-	-	-	-
OPHIIDIIDAE															
<i>Lophophidion brevibarbe</i>	165-260	4	72	15	57	0	127-129	0	106-111	-	0	0	0	0	0
<i>Lophophidion cervinum</i>	190-240	4	72-75	15	57-59	0	132-134	0	111-117	9	0	0	0	0	0
<i>Lophophidion elongatum</i>	210-240	4	71-75	15	59-61	0	133-139	0	111-116	9	0	0	0	0	0
<i>Lophophidion halophilum</i>	155-165	2	73-72	14	52-56	0	130-135	0	108-115	9	0	0	0	0	0
<i>Lophophidion hawaiiense</i>	150-180	2	72-73	14	57	0	128	0	108	9	0	0	0	0	0
<i>Lophophidion profundorum</i>	200-220	4	72	14	57	0	126-132	0	106-108	9	0	0	0	0	0
<i>Lophophidion branickii</i>	210-230	4	66-67	16	50-51	0	135-137	0	96-100	9	0	0	0	0	0
<i>Lophophidion grayi</i>	190-265	4	64-65	16	48-49	0	133-134	0	98-105	9	0	0	0	0	0
<i>Lophophidion holbrookii</i>	125-260	4	65-67	16	50-51	0	130-136	0	95-111	9	0	0	0	0	0
<i>Lophophidion walshi</i>	175-210	4	66-67	16	51-53	0	128-136	0	111-122	9	0	0	0	0	0
<i>Lophophidion concolor</i>	60-122	3	57-59	14	13-15	0	102-105	0	82-85	9	0	0	0	0	0
<i>Nessiodon marginata</i>	145-180	4	68-69	15	53-54	0	117-124	0	118-124	9	0	0	0	0	0

TABLE 1.—Meristic characters of some marine fishes of the western North Atlantic Ocean.—Continued.

FAMILY Genus, species	Size range SL mm	Speci- mens exam- ined No.	VERTEBRAE			DORSAL FIN		ANAL FIN		CAUDAL FIN				
			Total	Precaudal	Caudal	Spines	Rays	Spines	Rays	Total	Dorsal secondary rays	Dorsal primary rays	Ventral primary rays	Ventral secondary rays
			Number											
<b>SCHAFNIDAE</b>														
<i>Bairdiella chrysura</i>	160-112	12	25	11	12	12	19-22	2	8-10	31-34	8-9	9	8	5-8
<i>Bairdiella ronchus</i>	135-153	2	25	11	12	11	23-24	2	8	34	9	9	8	8
<i>Gymnoscia armatus</i>	150-177	3	25	13	12	11	25-27	2	10-12	28-33	6-8	9	8	5-8
<i>Gymnoscia lamottei</i>	180-215	4	25	13	12	11	24-26	2	9	30-32	7-8	9	8	6-7
<i>Gymnoscia leiacanthus</i>	112-178	3	25	13	12	11	21-23	2	11	31-32	7-8	9	8	7
<i>Gymnoscia nebulosus</i>	121-220	8	25	13	12	11	24-27	2	10-11	29-33	6-9	9	8	5-7
<i>Gymnoscia notatus</i>	121-130	27	14	13	11	11	28-30	2	9	30-32	7-8	9	8	6-8
<i>Gymnoscia ornatus</i>	120-155	10	25	13	12	11	24-26	2	10-12	26-32	7-9	9	8	5-7
<i>Gymnoscia rufescens</i>	90-125	25	14	11	11	11	27-30	2	7-8	28-31	6-7	9	8	6-7
<i>Yquetus acuminatus</i>	90-104	6	25	10	15	10	10-11	2	6-8	30-32	7-8	9	8	6-7
<i>Yquetus lanceolatus</i>	100-122	4	25	10	15	11	13-14	2	6	27-28	6-7	9	8	4-5
<i>Yquetus punctatus</i>	77-197	5	25	10	15	13	14-19	2	7-8	29-31	7	9	8	5-7
<i>Yquetus umbrosus</i>	118-165	4	25	10	15	9-11	35-39	2	7	31-32	7-8	9	8	7
<i>Yquetus parvipinnis</i>	112-173	25	10	15	15	7	20	2	19-20	30-35	7-9	9	8	6-9
<i>Yquetus maculatus</i>	125-135	25	10	15	15	11	21-22	2	8-9	29-33	6-7	9	8	6-7
<i>Yaricus fasciatus</i>	21-120	10	25	10	15	11	11-12	2	6	24-31	6-7	9	8	4-7
<i>Teleostomus xanthurus</i>	27-182	15	25	10	15	11	29-32	2	12-13	29-33	6-8	9	8	6-8
<i>Macrodontos ancylodon</i>	221-230	3	26	14	12	10-11	29-30	2	9-10	30	6-7	9	8	6-7
<i>Menticirrhus americanus</i>	171-195	4	25	10	15	11	24-26	2	7-8	32-33	6-9	9	8	7
<i>Menticirrhus littoralis</i>	72-113	4	25	10	15	11	24-25	2	7	30-31	7-8	9	8	6
<i>Menticirrhus martinicensis</i>	210-233	2	25	10	15	11	23	2	7	31-32	8	9	8	6-7
<i>Menticirrhus sanctifilis</i>	75-213	2	25	10	15	11	23-25	2	7-8	32-34	6-9	9	8	6
<i>Menticirrhus fuscus</i>	140-195	5	25	10	15	11	26-28	2	8-9	33-34	9-10	9	8	6-9
<i>Microlepidotus</i>	101-200	5	25	10	15	11	26-29	2	8	31-34	8-9	9	8	6-8
<i>Microlepidotus undulatus</i>	118-177	4	25	11	14	9	30-34	2	10	31-33	8	9	8	6-8
<i>Odontoscion dentex</i>	115-180	4	25	12	13	12	21-23	2	9	35-37	9-11	9	8	9
<i>Ophionotus costaricensis</i>	118	1	25	10	15	11	21	2	9	35	9	9	8	9
<i>Paralonchurus brasiliensis</i>	112-153	4	29	11	18	11	24-30	2	8	28-30	6	9	8	5-7
<i>Paralonchurus petterii</i>	105-155	4	25	10	15	11	21-33	2	7	27-32	5	9	8	5-6
<i>Sciaenidae</i>	183-203	6	21	10	11	11	21-22	2	6	30-33	8-9	9	8	7
<i>Sciaenoides ocellata</i>	20-26	25	10	15	11	11	23-25	2	7-8	32-36	8-10	9	8	7-9
<i>Stellifer lanceolatus</i>	38-108	7	25	10	15	12-13	21-24	2	7-9	30-35	7-9	9	8	6-9
<i>Stellifer radiifer</i>	137-168	4	25	10	15	12-13	21-23	2	8-9	33-36	7-10	9	8	7-9
<i>Stellifer stellifer</i>	47	1	21	9	15	12	20	2	8	34	9	9	8	7
<i>Umbrina gracilicirrhus</i>	87-174	4	25	10	15	11	22-23	2	7-8	30-33	7-8	9	8	6-7
<b>SCORPENOIDAE</b>														
<i>Scorpaena scaurus</i>	51-58	5	66-67	40	26-27	0	10-11+5	0	13-16	21-25	3-4	7	8	3-6
<b>SCORPENIDAE</b>														
<i>Auxis thazard</i>	52-115	5	39	20	19	11-12	11-12+8	-	11+7-8	11	13	9	8	11
<i>Pathynus alletteratus</i>	38	1	39	19	20	17	12+7	-	13+7	-	-	-	-	-
<i>Pathynus pelagicus</i>	370	1	51	22	19	16	11+9	2	12+7	-	-	-	-	-
<i>Sciaena australis</i>	10-15	1	50	25	25	22	11+9	2	11+7	-	-	-	-	-
<i>Sciaena japonicus</i>	170-180	30-31	11	16-17	16-17	10-11	12+4-5	2	11+4-5	35-36	8-11	9	8	10
<i>Sciaena scombrus</i>	68	1	31	14	17	11	14+5	2	11+5	-	-	-	-	-
<i>Sciaenobrama cavalla</i>	120-150	12-43	17	25-26	16	11-16	8-11	1	13-15+8-9	43-44	13-21	9	8	13
<i>Sciaenobrama maculatus</i>	155-220	52-53	21	31-32	18-19	14-16+8-9	4	14-16+7-8	11	12	9	8	12	-
<i>Thunnus albacares</i>	580	1	39	18	21	13	12+4	-	12+4	-	-	-	-	-
<i>Thunnus atlanticus</i>	500	1	39	19	20	14	11+6	1	12+7	-	-	-	-	-
<i>Thunnus thynnus</i>	75	1	39	16	21	17	12+6	2	12+7	45	15	9	8	13
<b>SCORPANTIDAE</b>														
<i>Helicolenus dactylopterus</i>	186-210	4	25	10	15	12	3	5	34-36	10-12	7	7	9-10	-
<i>Nemipterus brasiliensis</i>	75-91	4	21	9	15	12	9	3	26-29	7-8	7	7	5-7	-
<i>Nemipterus pollux</i>	222	1	21	9	15	12	10	3	27	7	7	7	6	-
<i>Ponticus castor</i>	63-69	3	24	9	15	12	10-11	3	25-27	6-7	7	7	5-6	-
<i>Ponticus longipinnis</i>	108-135	4	24	9	15	12	9	3	27-29	7	7	7	6-7	-
<i>Ponticus macrostomus</i>	50-56	4	24	9	15	12	9	3	27	7	7	7	5-6	-
<i>Ponticus Rathbuni</i>	63-105	3	24	9	15	12	9	3	27-29	7	7	7	6-7	-
<i>Scorpis assasi</i>	64-127	4	24	9	15	12	9	3	25-26	6	7	7	5-6	-
<i>Scorpis berndti</i>	71-133	3	24	9	15	12	9	3	27-29	7	7	7	6-7	-
<i>Scorpis brasiliensis</i>	92-187	4	24	9	15	12	8-10	3	26-28	6-7	7	7	6-1	-
<i>Scorpis calcarata</i>	107-135	4	24	9	15	12	9	3	25-27	6-7	7	7	5-6	-
<i>Scorpis dipper</i>	96-126	4	24	9	15	12	9	3	26-27	6-7	7	7	6	-
<i>Scorpis jacksoni</i>	73-158	3	24	9	15	12	8-9	3	25-29	6-7	7	7	5-6	-
<i>Scorpis isthmenius</i>	91-122	24-25	9	15-16	12	9	9	3	27-29	7-8	7	7	5-7	-
<i>Scorpis petricola</i>	24	1	24	9	15	12	9	3	26	7	7	7	5	-
<i>Scorpis blunieri</i>	165-297	2	24	9	15	12	9	3	24-25	5-6	7	7	5	-
<i>Scartichthys guentheri</i>	65-110	4	24	10	14	12	9	3	29	8	7	7	5	-
<i>Trachyscorpis cristulata</i>	117-204	3	25	9	16	12	9	3	30	8	7	7	6	-

TABLE 1.—Meristic characters of some marine fishes of the western North Atlantic Ocean.—Continued.

FAMILY Genus, species	Size range SL mm	Speci- mens exam- ined No.	VERTEBRAE			DORSAL FIN		ANAL FIN		CAUDAL FIN					
			Total	Precaudal	Caudal	Spines	Rays	Spines	Rays	Total	Bursal secondary rays	Bursal primary rays	Ventral primary rays	Ventral secondary rays	
Number															
OPISTHOGNATHIDAE															
<i>Longichthys higmani</i>	54-81	1	28	10	18	11	18	3	16-17	23	3-4	8	8	3-4	
<i>Opiostognathus macrognathus</i>	116-131	2	30	10	20	11	15	3	17	23	4	8	8	3	
<i>Opiostognathus maxillopus</i>	75-105	3	26	10	18	11	15	3	14-15	24-25	5	8	8	3-4	
OSTRACIIDAE															
<i>Lactophrys polyommus</i>	26-120	4	13	8	5	0	10	0	-	-	0	5	5	0	
<i>Lactophrys quadricornis</i>	42-118	5	14	8	6	0	10	0	-	-	0	5	5	0	
PEMPHRIDAE															
<i>Pempheris schomburgkii</i>	62	1	25	10	15	5	8	3	32	29	7	9	8	5	
PERCOPHIDAE															
<i>Benthong anatirostris</i>	130-216	4	26	9	19	6	14-15	0	17-19	34-36	10-11	8	7	9-10	
<i>Benthong gobiooides</i>	163-192	4	30	9	21	6	16-17	0	17-18	34-36	10-11	8	7	9-10	
<i>Benthong macrostomus</i>	115-160	4	28	9	16	6	14	0	17-18	36-37	11-12	8	7	10	
<i>Chromisops squamiferum</i>	72-74	2	28	9	19	6	15	0	18	40-41	13	8	7	12-13	
PLATYPOCTIDAE															
<i>Glyptocephalus cynoglossus</i>	220-230	2	57-58	11-12	45-47	0	108-117	0	91-101	22-23	0-1	11	11	0	
<i>Halichoelops albomarginatus</i>	104-107	4	40-41	10	30-31	0	61-64	20	53-54	20	1	9	8	2	
<i>Halichoelops benni</i>	90-104	4	41-42	10	31-32	0	63-66	0	53-56	20	1	9	8	2	
POECILIIDAE															
<i>Gambusia affinis</i>	23-26	4	32-33	14	18-19	0	7-8	0	11	23-28	-	-	-	-	
<i>Poecilia formosa</i>	106-20	4	21	14	17	0	7-8	0	9	24	-	-	-	-	
<i>Poecilia latipinna</i>	20-24	4	29-30	13-14	15-17	0	13-14	0	8	30-32	-	-	-	-	
POLYMYXIDAE															
<i>Polymyxus lowei</i>	108-127	4	28	12	16	5	29-30	4	15	29	6	9	9	5	
<i>Polymyxus nobilis</i>	130-195	3	28	12	16	5	35-36	4	16-17	29	6	9	9	5	
POLYPTERIDAE															
<i>Polydactylus octonotus</i>	63-66	4	24	10	11	9	11-12	3	13	41-43	12-13	9	8	12-13	
<i>Polydactylus virginicus</i>	72-24	3	24	10	14	8-9	10-11	3	12-13	-	-	9	8	-	
POACENTRIDAE															
<i>Acanthoclinus analogus</i>	115	1	26	11	15	13	12	2	10	26	6	8	7	5-6	
<i>Acanthoclinus stellatus</i>	55-125	3	26	11	15	13	15	2	12	26-27	6	8	7	5-6	
<i>Chrysipterichthys</i>	75-82	1	26	11	15	13	12	2	12	25	5	8	7	4-5	
<i>Chromis insolitus</i>	55-60	4	26	11	15	13	12	2	11	26-25	5	8	7	4-5	
<i>Foaocentrus fluvius</i>	55-62	4	26	11	15	12	15-16	2	13-14	25	5	8	7	4-5	
<i>Foaocentrus leucostictus</i>	40-51	4	26	11	15	12	15	2	13	25	5	8	7	4-5	
<i>Foaocentrus planifrons</i>	38	1	26	11	15	12	15	2	13	25	5	8	7	5	
POAMANTIDAE															
<i>Aulostomus surinamensis</i>	119-165	2	26	10	16	11-12	17-18	3	10-11	42-43	13	9	8	12-13	
<i>Aulostomus virginicus</i>	86-178	3	26-27	10	16-17	12	16-17	3	7	35-39	10-11	9	8	10-11	
<i>Conodon nobilis</i>	135-155	4	26	10	16	12	13	3	7	39-40	11-12	9	8	11	
<i>Gymnentrus luteus</i>	112-190	4	26	10	16	13	11-13	3	11	35-37	10	9	8	6-10	
<i>Hemimulon album</i>	161-238	2	26	10	16	12	16-17	3	7-8	39-40	12-13	9	8	9-11	
<i>Hemimulon aurolinatum</i>	93-133	4	26	10	16	13-14	11-15	3	9	38-40	11-12	9	8	10-11	
<i>Hemimulon heteropterum</i>	93-138	1	26	10	16	12	14	3	9	31	13	9	8	11	
<i>Hemimulon melanurus</i>	95-135	3	26	10	16	12	14	3	8	33-36	9-10	9	8	6-9	
<i>Hemimulon melanurus</i>	97-115	4	26	10	16	12	15-16	3	8	37-40	10-12	9	8	10-11	
<i>Hemimulon plumieri</i>	77-227	4	26	10	16	12	15-16	3	9	37-39	9-12	9	8	10-11	
<i>Hemimulon stellifer</i>	137-160	4	26	10	16	12	16	3	9	39-41	11-12	9	8	11-12	
<i>Hemimulon atritrus</i>	86-102	4	26-27	10	16-17	13	13-15	3	8-9	39-42	12-13	9	8	10-12	
<i>Orthopristis chrysoptera</i>	117-165	4	26	10	16	12-13	13-15	3	10-11	40-41	12-13	9	8	11-12	
<i>Orthopristis cyanopterus</i>	95-133	4	26	10	16	12-13	15-16	3	13	40-42	12-13	9	8	11-12	
<i>Orthopristis rubra</i>	152-185	4	26	10	16	12	15-16	3	10	38-40	12	9	8	9-11	
<i>Pomadasys cornutusformis</i>	125-170	4	26	10	16	12	15-16	3	7	35-39	11-12	9	8	10-12	
POMATOMIDAE															
<i>Pomatomus saltatrix</i>	112-210	4	26	11	15	9	24-25	3	26-28	35-36	9-10	9	8	9-10	
PRISTACANTHIDAE															
<i>Coccolepis boops</i>	159	1	23	10	13	10	12	3	12	25	5	8	8	4	
<i>Pristacanthus arenatus</i>	137-168	4	23	10	13	10	11	3	11	26-28	4	8	8	5-6	
<i>Pristacanthus cruentatus</i>	135	4	23	10	13	10	11	3	10	24	4	8	8	4	
<i>Pristigenys alta</i>	89-135	4	23	10	13	10	11	3	10	24	4	8	8	4	
RACHYCENTRIDAE															
<i>Rachycentron canadum</i>	455	1	25	11	14	10	29	2	24	41	16	9	8	8	
SCARPIDAE															
<i>Cryptotomus roseus</i>	57-67	3	25	10	15	9	10	3	9	25-27	7	7	6	5-6	
<i>Nichollisia usta</i>	117-148	3	25	10	15	9	10	3	9	26-28	7-6	7	6	6-7	
<i>Scarus croicensis</i>	69-210	3	25	10	15	9	10	3	9	25-27	6-7	7	6	6-7	
<i>Sparisoma chrysopterum</i>	67-95	3	25	10	15	9	10	3	9	25-27	6	6	6	6	
<i>Sparisoma viride</i>	81-121	1	25	10	15	9	10	3	9	25-27	6-7	7	6	6-7	
<i>Sparisoma viride</i>	74-92	2	25	10	15	9	10	3	8-9	26-26	7-8	7	6	6-7	
<i>Sparisoma viride</i>	192	1	25	10	15	9	10	3	9	26	6	7	6	7	

TABLE 1.—Meristic characters of some marine fishes of the western North Atlantic Ocean.—Continued.

FAMILY Genus, species	Size range SL mm	Speci- mens exam- ined No.	VERTEBRAE			DORSAL FIN		ANAL FIN		CAUDAL FIN					
			Total	Precaudal	Caudal	Spines	Rays	Spines	Rays	Total	Dorsal secondary rays	Dorsal primary rays	Ventral primary rays	Ventral secondary rays	
			Number												
<b>SERRANIDAE</b>															
<i>Acanthiasicus lepturus</i>	191-295	4	26	10	16	10	14	3	8	40-43	13-14	8	7	12-14	
<i>Centropristes ocyurus</i>	125-155	24	10	14	10	10	11	3	7	34-35	9-10	9	8	8	
<i>Centropristes philadelphica</i>	101-167	4	20	10	10	10	11	3	7	34-35	9-10	9	8	7-9	
<i>Centropristes punctata</i>	97-150	4	26	10	16	10	10	3	7	34-36	9-10	9	8	8	
<i>Chenophthalmus fulvis</i>	78-235	4	26	10	16	9	15	3	8-9	35-36	9-10	9	8	9	
<i>Choristium brachyrhynchus</i>	82	1	24	10	14	8	12	3	8	31	8	6	6	8	
<i>Dermatolepis inermeus</i>	373	1	24	10	14	11	19	3	9	31	7	9	6	7	
<i>Diplectrum bivittatum</i>	105-113	4	24	10	14	10	12	3	7	39-40	12	9	8	10-11	
<i>Diplectrum formosum</i>	133-175	4	24	10	14	9-10	12	3	7	38-40	11-12	9	8	10-11	
<i>Diplectrum maculatum</i>	92-155	4	26	10	16	10	12	3	7	34-35	11-12	9	8	8-9	
<i>Ephippichthys grammehayi</i>	215-285	2	26	10	16	11	16	3	9	37-40	10-12	8-9	6	11-11	
<i>Epinephelus flavomaculatus</i>	165-205	4	24	10	14	11	14	3	9	33-35	8-9	9	8	8-9	
<i>Epinephelus guttatus</i>	177-205	2	24	10	14	11	16	3	8	35-37	9-10	9	8	9-10	
<i>Epinephelus systaticus</i>	118	1	24	10	14	11	14	3	9	34	9	6	6	8	
<i>Epinephelus nigritilis</i>	170	1	24	10	14	10	11	3	9	33	8	9	8	7-8	
<i>Epinephelus niveatus</i>	74-116	4	24	10	14	11	13-14	3	9	33-34	8-9	9	8	8-9	
<i>Epinephelus marginatus</i>	100-122	2	26	10	16	11	17	3	8	30-31	10	9	8	8	
<i>Hemimyrus vivianus</i>	52-102	6	26	10	16	9-10	13-14	3	8	39-41	12-13	8	7	11-13	
<i>Hypopercops bonaci</i>	120	1	24	10	14	11	17	3	12	38	11	9	8	10	
<i>Hypopercops falcatum</i>	210	1	24	10	14	11	17	3	11	36	11	9	8	10	
<i>Hypopercops interstitialis</i>	127	1	24	10	14	11	16	3	11	37	10	9	8	9-10	
<i>Hypopercops microlepis</i>	122-205	3	24	10	14	11	16-17	3	10-12	37	10-11	9	8	9-10	
<i>Hypopercops phanoides</i>	45-56	3	26	10	16	11	16-17	3	11	37-38	10-11	9	8	10	
<i>Hypopercops setifer</i>	393	1	24	10	14	11	16	3	11	38	10	9	8	9	
<i>Oxyanthias martinicensis</i>	70-104	4	26	10	16	10	15	3	7	33	9	8	7	9	
<i>Paranthias furcifer</i>	65-96	2	24	10	14	9	18-19	3	9	40	12	9	8	11	
<i>Petrometopon cruentatum</i>	103-125	3	24	10	14	9	14	3	8	33-34	8-9	9	8	8	
<i>Pike cubensis</i>	66-107	4	24	10	14	8	13	3	7-8	34-35	9	8	8	8-9	
<i>Pronotogrammus aureocubensis</i>	125-195	4	26	10	16	10	15	3	8	33-34	9-10	9	8	9-10	
<i>Schultziella petrae</i>	52-57	4	26	10	16	10	11-12	3	7	36-37	9-10	9	8	7-8	
<i>Serranus auratus</i>	23-44	2	24	10	14	10	12	3	7	32-33	8	9	8	7-8	
<i>Serranus atrobarbus</i>	75-87	4	24	10	14	10	12	3	7	35-36	10	9	8	8-9	
<i>Serranus chionostoma</i>	33-47	4	24	10	14	10	11-12	3	7	32	8	9	8	7	
<i>Serranus maytagi</i>	59-72	4	24	10	14	10	11-12	3	6-7	37-38	10-11	9	8	10	
<i>Serranus notospilus</i>	99-114	4	26	10	16	11	12	3	7	34-35	11-12	9	8	10-11	
<i>Serranus pectoralis</i>	112-140	2	24	10	14	10	12	3	7	34-35	10-11	9	8	9-10	
<i>Serranus obliquarius</i>	60-76	4	24	10	14	10	13-14	3	7	31-32	7-8	9	8	7	
<i>Serranus tabacarius</i>	48-117	4	24	10	14	10	12	3	7	34-36	9-10	9	8	8-9	
<i>Serranus tortuganus</i>	19-63	3	24	10	14	10	12	3	7	33-34	8-9	9	8	8-9	
<b>SOLEIDAE</b>															
<i>Achirus inscriptus</i>	70-93	5	27-28	9	18-19	0	54-58	0	0	40-41	15-16	0	7-8	8	
<i>Aulopus vittatus</i>	91-118	3	28	9	19	0	53-58	0	0	40-43	16	0	8	8	
<i>Gymnachirus melas</i>	52-117	3	35-36	9	26-27	0	60-70	0	0	41-51	16	0	8	8	
<i>Monacanthus maculatus</i>	80-92	4	28-29	9	19-20	0	51-55	0	0	41-42	16	0	8	8	
<b>SERRANINAE</b>															
<i>Archosargus probatocephalus</i>	69-112	4	24	10	14	11	12	3	9-10	32-33	8-9	9	8	7	
<i>Archosargus probatocephalus</i>	168-205	3	24-25	10	14	11	13	3	10-11	32-33	8-9	9	8	7-8	
<i>Birdsheadia hololepis</i>	137-157	4	24-25	10	14	11-13	12-13	3	10-15	31-34	8-9	9	8	8	
<i>Lagodon rhomboides</i>	72-76	4	24	10	14	12	11	3	11	34-38	10-11	9	8	7-10	
<i>Figulus adsceticus</i>	129-162	2	24	10	14	11	10	3	8	35-37	9-10	9	8	9-10	
<i>Stenotomus capricornis</i>	109-118	4	24	10	14	12	12	3	11-12	33-34	9-10	9	8	7-8	
<i>Stenotomus crypsus</i>	107-122	4	24	10	14	12	12	3	11	34-37	9-10	9	8	8-10	
<b>SERRANINAE</b>															
<i>Schyrana borealis</i>	122-206	2	24	12	12	6	9	2	9	35	9	9	8	9	
<i>Schyrana guacharo</i>	168-220	4	24	12	12	6	9	2	8	36	10	9	8	9	
<i>Schyrana ricordii</i>	125	1	24	12	12	6	9	2	9	35	9	9	8	9	
<b>STYHNOPTERCIDAE</b>															
<i>Styphnophryne monae</i>	70	2	30-31	10	20-21	0	12-13	0	0	11-12	39-41	10-11	10	9	10-11
<b>STERNOptyCHIDAE</b>															
<i>Agyropsaleutes aculeatus</i>	50-57	4	35-36	11	24-25	0	7-9	0	0	7-7	32-36	8-11	10	9	5-6
<i>Agyropsaleutes affinis</i>	51-57	4	36-39	11	27-28	0	7-9	0	0	7-5	-	9-10	9	-	
<i>Agyropsaleutes gigas</i>	52	1	39	11	25	0	7-9	0	0	7-5	-	9	10	-	
<i>Agyropsaleutes heteropterus</i>	101-124	2	36	11	27	0	11-15	0	0	11-13	-	-	-	-	
<i>Polydiplosis latirostris</i>	50-67	2	33	10	23	0	11-15	0	0	15-17	35-36	9-11	10	6-7	
<i>Polydiplosis latirostris</i>	27-40	4	33-34	10	23-24	0	11-15	0	0	15-16	36	10	9	7	
<i>Sternopyx diaphana</i>	34-47	5	29-30	11	18-19	0	9-11	0	0	14	33-35	7-8	10	7-8	
<b>STROMATEIDAE</b>															
<i>Cubiceps californiensis</i>	128-164	4	30-31	15-16	15	12	15-16	3	14-15	35-37	9-10	9	8	9-10	
<i>Cynoglossus nigripectus</i>	100-115	4	31	15	16	12	15	3	15	35-37	9-10	9	8	9-10	
<i>Nemipterus gracilis</i>	68-136	2	41-42	16	25-26	12-13	27-28	2	26-27	34-35	8-9	9	8	9	
<i>Pteripis alepidodous</i>	61-77	4	30	13	17	3	44-46	3	41-43	28	6-9	9	8	5-6	
<i>Pteripis paru</i>	178	1	30	13	17	3	43	3	40	29	6	9	8	6	
<i>Poronotus trilacanthus</i>	115-120	4	32	12	20	3	43-47	3	39-44	31-34	7-9	9	8	7-8	
<i>Pteripis cyanophrys</i>	67-123	4	31	14	17	11	25-26	3	26-27	33-34	8-9	9	8	8	
<i>Pteripis pacifica</i>	75-122	3	31	14	17	12-13	25-28	3	24-25	32-34	8-9	9	8	7-8	
<i>Pteripis lutea</i>	63-193	4	31	14	17	15	14-15	3	14-15	36-41	10-12	11	9	9-12	
<i>Tetragonopterus atlanticus</i>	160	1	45	23	22	15	9	2	9	36	11	9	7	10	
<b>SYLPHIOPRIMIDAE</b>															
<i>Sylphophorus chordatus</i>	215	1	53	-	-	-	-	-	-	-	-	-	-	-	
<b>SYNCHETIDAE</b>															
<i>Hippocampus erectus</i>	105-180	4	49-51	13	36-38	0	19-20	0	0	0	0	0	0	0	0
<i>Micrognathus crinitus</i>	65	1	56	17	39	0	-	0	0	0	0	0	0	0	0
<i>Micrognathus dunckeri</i>	47-52	4	50-53	18	32-35	0	-	0	0	0	0	0	0	0	0
<i>Micrognathus elongatus</i>	15-50	2	49-50	18	31-32	0	-	0	0	0	0	0	0	0	0
<i>Micrognathus floridana</i>	115-122	3	51-52	18	33-34	0	-	0	0	0	0	0	0	0	0
<i>Micrognathus fuscus</i>	108-295	4	55-60	19-20	36-39	0	35	0	0	0	0	0	0	0	0
<i>Micrognathus longimanus</i>	115-150	4	52-54	19-20	37	0	-	0	0	0	0	0	0	0	0
<i>Micrognathus maculatus</i>	105-210	4	50-53	20	30-33	0	27-28	0	0	0	0	0	0	0	0
<i>Micrognathus palauicus</i>	72-102	4	49-52	18-19	31-33	0	28-29	0	0	0	0	0	0	0	0
<i>Micrognathus scovelli</i>	87-95	4	49-51	17-18	31-33	0	29-32	0	0	0					

TABLE 1.—Meristic characters of some marine fishes of the western North Atlantic Ocean.—Continued.

FAMILY Genus, species	Size range SL	Speci- mens exam- ined	VERTEBRAE			DORSAL FIN		ANAL FIN		CAUDAL FIN				
			Total	Precaudal.	Caudal	Spines	Rays	Spines	Rays	Total	Dorsal secondary rays	Dorsal primary rays	Ventral primary rays	Ventral secondary rays
	No.													
<b>SYNODONTIDAE</b>														
<i>Saurida brasiliensis</i>	50-112	5	46-50	-	-	0	11	0	11	37-40	9-11	10	9	9-10
<i>Saurida caribbeana</i>	80-150	5	52-58	-	-	0	11-12	11-12	11-12	40-42	11-12	10	9	9
<i>Saurida normani</i>	53-330	6	49-52	-	-	0	11-12	0	10-11	41-45	11-13	10	9	11-13
<i>Saurida spumaria</i>	32-120	2	52-52	-	-	0	10-11	10-11	10-11	41-45	10-11	10	9	9-10
<i>Synodus aculeatus</i>	89-315	5	54-51	-	-	0	11-12	12-13	12-13	41-43	11-12	10	9	12-12
<i>Synodus intermedius</i>	62-190	1	47-50	-	-	0	11-12	11-12	11-12	40-42	11-12	10	9	10-11
<i>Synodus porosus</i>	60-165	8	54-16	-	-	0	10-11	0	10	39-41	10-13	10	9	10-12
<i>Synodus auratus</i>	32-213	6	55-58	-	-	0	12-13	0	9-11	46-49	14-16	10	9	13-14
<i>Synodus synodus</i>	35-112	6	55-57	-	-	0	12-13	0	8-9	43-49	12-16	10	9	12-14
<i>Trachinophthalmus myops</i>	84-207	5	54-57	-	-	0	11-13	0	11-15	45	13	10	9	13
<b>TETRADONCIDAE</b>														
<i>Centroscyllium rostratum</i>	74-58	1	17	8	9	0	14-15	9	0	12-13	8	11	0	6
<i>Lycodesphalus laevigatus</i>	74-152	4	19	8	11	0	11-12	9	0	11	0	6	0	0
<i>Sphoeroides cutanatus</i>	107-113	3	18	8	10	0	8	0	7	11	0	6	0	0
<i>Sphoeroides dorsalis</i>	118-187	4	17	8	9	0	8	0	7	11	0	6	0	0
<i>Sphoeroides maculatus</i>	99-178	3	19	8	11	0	8	0	7	11	0	6	0	0
<i>Sphoeroides nephelus</i>	50-142	2	19-20	8	11-12	0	8	0	7	11	0	6	0	0
<i>Sphoeroides spengleri</i>	104-145	4	11-18	8	9-10	0	8	0	7	11	0	6	0	0
<i>Sphoeroides trachidionus</i>	72-129	4	18	8	10	0	8	0	7	11	0	6	0	0
<b>TRACHICHTHYIDAE</b>														
<i>Hoplactisetus mediterraneus</i>	75-88	4	26	11	15	6	13	3	9	33-34	7-8	10	9	7
<b>TRIACANTHODIDAE</b>														
<i>Bellator bellardii</i>	71-90	4	20	8	12	6	16-17	0	15	12	0	6	6	0
<i>Bellator bellardi schmidtii</i>	51-60	4	20	8	12	6	16-17	0	13	12	0	6	6	0
<b>TRICHLURIDAE</b>														
<i>Benthodessmus simonyi</i>	590	1	157	-	-	-	2	-	71-81	-	-	-	-	-
<i>Benthodessmus tenuis</i>	430-655	4	127-132	-	-	121-132	2	71-81	-	-	-	-	-	-
<i>Trichichthys lepturus</i>	310-380	4	169-173	39-40	130-134	3	132-138	2	89-107	-	-	-	-	-
<b>TRIOLIDAE</b>														
<i>Bellator brachypterus</i>	55-63	4	26	10	16	11	10-11	0	11	31-33	9-10	7	6	8-10
<i>Bellator secreta</i>	91-106	4	26	10	16	11	11	0	10-12	30-32	9-10	7	6	8-9
<i>Bellator militaris</i>	61-92	5	25-26	10	15-16	11	11	0	9-10	27-30	7-9	7	6	7-6
<i>Bellator rileyi</i>	30-59	8	26	10	16	11	11	0	9-11	27-28	7-8	7	6	8
<i>Prionotus glarius</i>	81-110	4	26	10	16	10	12-13	0	11	30-31	9-10	7	6	6-9
<i>Prionotus rufus</i>	72-104	4	26	10	16	10	12-13	0	11	29-31	9	7	6	9-10
<i>Prionotus carolinus</i>	172-168	4	26	10	16	10	12	0	12	31-33	9-10	7	6	9-10
<i>Prionotus exostoma</i>	113-157	4	26	10	16	10	12	0	11	32-35	10-11	7	6	9-11
<i>Prionotus ophryas</i>	98-137	4	26-27	10	16-17	10	12-13	0	10-11	25-27	6-7	6	6	6-8
<i>Prionotus paralatus</i>	69-118	4	26	10	16	9-10	12-12	0	11	31-32	9-10	7	6	9
<i>Prionotus pectoralis</i>	157-225	4	26-27	10	16-17	10	12-13	0	11-12	31-34	9-11	7	6	9-11
<i>Prionotus punctatus</i>	97-153	4	26	10	16	10	11-12	0	11	28-30	8-9	7	6	8
<i>Prionotus rufus</i>	113-157	4	26	10	16	10	12-13	0	10-11	31-32	9-10	7	6	9-10
<i>Prionotus aculeatus</i>	79-172	4	26	10	16	10	12	0	12	30-33	10-11	7	6	7-10
<i>Prionotus sternalis</i>	98-113	4	26	10	16	9-10	12	0	10-11	33-34	10-11	7	6	10
<i>Prionotus tribulus</i>	90-193	4	26	10	16	10	12	0	11	30-33	9-10	7	6	8-10
<i>Paristiopteron antillarum</i>	92-120	4	31	9	22	6	16	0	-	28	6	6	6	8
<i>Paristiopteron brevirostre</i>	92-170	4	32	9	23	6	16	0	-	25	6	6	6	6
<i>Paristiopteron maculans</i>	127-180	4	33-35	9	24-26	6	16	0	21-23	27-28	5	6	6	6-7
<i>Paristiopteron macrolepis</i>	110-130	4	31-35	9	25-26	6	16	0	18-21	28	5	6	6	7-8
<i>Paristiopteron grayi</i>	87-105	3	31-35	9	25-26	6	18	0	-	26-28	7-8	6	6	6
<i>Paristiopteron imberbis</i>	107-135	4	31-35	9	25-26	6	18	0	-	26-28	7-8	6	6	7-8
<i>Paristiopteron longipinnata</i>	122-135	4	32-33	9	23-24	6	17	0	-	26-28	7-8	6	6	7
<i>Paristiopteron minimata</i>	118-148	4	33	9	24	6	17	0	-	26-28	7-8	6	6	7-8
<i>Paristiopteron schmitti</i>	73-94	4	31-33	9	22-24	6	17	0	-	26	7	6	6	7
<i>Paristiopteron tricuspidata</i>	115-124	3	33-34	9	24-25	6	18	0	19	26	7	6	6	7
<i>Paristiopteron unifascia</i>	130-153	2	33	9	24	6	19-20	0	20	25-26	6-7	6	6	7
<b>URANOSCOPIIDAE</b>														
<i>Astroscopus guttatus</i>	230	1	25	11	14	5	13	0	13	22	5	7	6	4
<i>Astroscopus y-gracilis</i>	80-110	4	25	11	14	5	13-14	0	13-14	25-26	6-7	7	6	6-7
<i>Gymnophorus erectorius</i>	83-125	4	25	11	14	5	12-11	0	12-11	26-29	6-9	7	6	7-8
<i>Kathetostoma alboguttata</i>	85-111	3	25	15	15	0	14-15	0	12-13	22	5	7	6	4
<i>Kathetostoma cubana</i>	62-118	5	26	11	15	0	14-15	0	13-14	23	5	7	6	5
<b>XIPHIDAE</b>														
<i>Xiphias gladius</i>	53-170	4	26	14	12	-	52	-	-	31-32	7-9	9	8	7
<b>ZEIDAF</b>														
<i>Cyrtopsis rosea</i>	85-115	4	31	10	21	7	28-29	2	28-29	20-21	3-4	6	7	4
<i>Paraten pacifica</i>	105-118	4	34	12	22	8-9	26-29	1	31-33	27-28	6-9	6	7	6
<i>Monopterus ocellatus</i>	68-75	4	35	12	23	8-9	24-26	3	22-25	15	1	7	6	1
<b>ZENIONTIDAE</b>														
<i>Zenion hololepis</i>	60-72	4	27	11	16	5-6	26-28	1-2	22-23	18	3	6	7	2
<b>ZOARCIIDAE</b>														
<i>Macrocaraus americana</i>	310-390	4	137-138	25-27	111-112	18-21	90-94+28-31	0	113-115	-	-	-	-	-

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FREQUENCY AND DURATION OF FLOW  
REVERSAL IN THE LOWER COLUMBIA  
RIVER, APRIL 1968-MARCH 1970

The hydraulic head generated by some heights of tide can result in changes in direction of current in the lower Columbia River when volume discharges fall below a critical value. In connection with this phenomenon, Clark and Snyder (1969) conducted a study to determine the timing and extent of reversal of flow during an extreme condition of low discharge of water from the river. They determined that flow reversals could increase the accumulation of discharged effluents per given volume of river

water by as much as 3.5 times over the accumulation at mean flow rates. Their report showed the need for a continuing record of direction of current in the lower Columbia River to determine the importance of flow reversal at different discharge rates. To help satisfy this need, a floating laboratory (Snyder, Blahm, and McConnell, 1971) was established on the lower Columbia River at river kilometer 117.5 (river mile 73) near Prescott, Oreg., where speed and direction of current were recorded. This report describes the flow-reversal phenomenon at river kilometer 117.5 from data collected between April 1968 and March 1970.

Procedure

The velocity of the river current was measured with a Savonius meter<sup>1</sup> suspended from the laboratory to determine the frequency and duration of flow reversal in the lower Columbia River. With the exception of 21 days, the flow was monitored continuously for a 2-year period. Flow data obtained at Prescott were related to the daily discharge of the river and to the time and height of ocean tides near the river's mouth at Astoria, Oreg.

Daily average flow for the period 1 April 1968 to 30 June 1969, was "gauged flow" furnished by the U.S. Geological Survey office in Portland, Oreg.; daily average flow for the period 1 July 1969 to 31 March 1970, was from information furnished by U.S. Geological Survey offices in Portland, Oreg., and Tacoma, Wash. Time and height of oceanic tides were for Astoria, Oreg.; these data were obtained from tide charts of the NOAA (National Oceanic and Atmospheric Administration) National Ocean Survey.

Our observations of direction and speed of current were used to determine the duration and frequency of flow reversals. Only those flow reversals of 60-min duration or longer were considered to constitute true reversals. Duration of flow reversal was defined as the time interval between positive downstream flows wherein the

<sup>1</sup> Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.